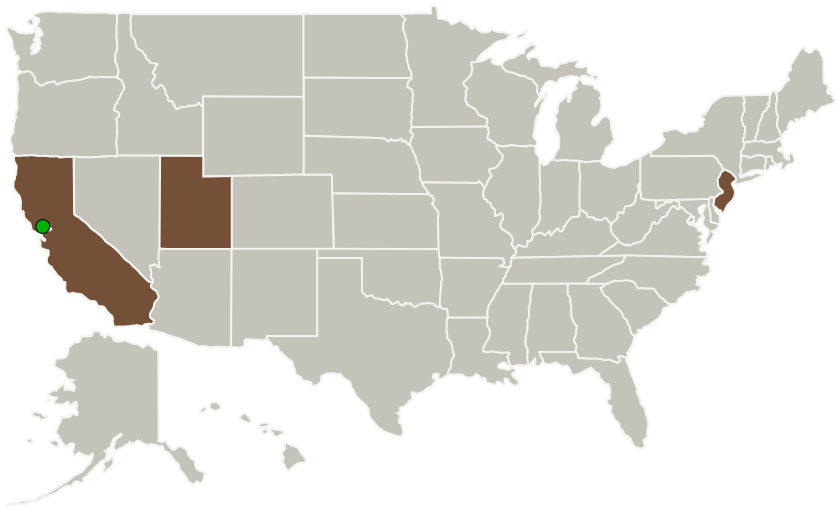
Conjugate Etalon Spectral Imager (CESI) & Scanning Etalon Methane Mapper (SEMM), Phase I

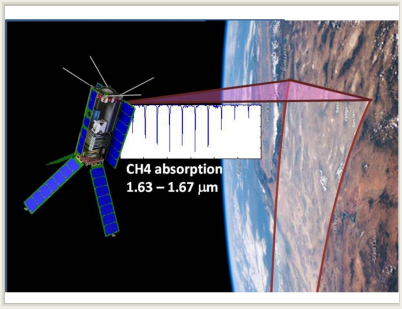
Completed Technology Project (2013 - 2014)

Project Introduction

The Conjugate Etalon Spectral Imaging (CESI) concept enables the development of miniature instruments with high spectral resolution, suitable for LEO missions aboard CubeSat or nanosat buses, including constellation missions providing global coverage and characterization of dynamic phenomena. Small size, low power, and a simplified instrument architecture support missions for earth observation, atmospheric science, and planetary science. Unlike prior art hyperspectral and ultraspectral instruments that are much too large and complex for deployment on a nanosat, the CESI concept can be implemented in a small form factor using inexpensive components and requiring only a small optical aperture. CESI superimposes the interferogram from a conjugate Fabry-Perot etalon on the image of a scanned scene captured on a novel high-sensitivity low-noise SWIR focal plane. Using image processing, high resolution spectral characterization is performed independently for each point in the scene. The innovative focal plane and spectroscopic concepts have many promising scientific and commercial applications. The Scanned Etalon Methane Mapper (SEMM) is a CubeSat instrument that incorporates the CESI concept to perform global daytime mapping of atmospheric methane column density. Performance capabilities: ground resolution 100 m; concentration sensitivity 18 ppb; and global revisit ~ 60 days.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Wavefront LLC	Lead Organization	Industry Minority-Owned Business	
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California
Space Dynamics Laboratory	Supporting Organization	Academia	North Logan, Utah
Utah State University - Space Dynamics Laboratory(SDL)	Supporting Organization	Academia	North Logan, Utah

Primary U.S. Work Locations	
California	New Jersey
Utah	

Project Transitions

May 2013: Project Start

May 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140489)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Wavefront LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Alan B Marchant

Co-Investigator:

Alan M Marchant

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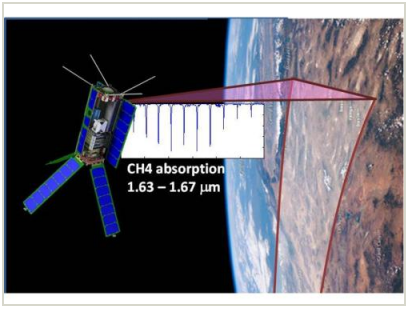
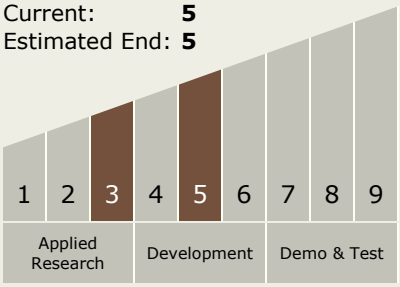
Images



Project Image
Conjugate Etalon Spectral Imager (CESI) & Scanning Etalon Methane Mapper (SEMM)
(https://techport.nasa.gov/image/134459)

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.1 Field and Particle Detectors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System